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AEROSOL INHALATION DEVICE

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(56) Prior Art Documents
US 4534343
US 4259951

(57) Claim

1. Apparatus comprising:

a housing adapted to cooperate with, attached to, or formed integrally with a chamber to define a major fluid passage comprising an upstream zone within the chamber and a downstream zone,

a major fluid exit provided in the downstream zone,

a back-flow fluid exit in selective fluid communication with the downstream zone, and

a diaphragm mounted within the housing and comprising:

a central region interfacing the upstream and downstream zones and being openable to allow fluid flow therethrough from the upstream zone to the downstream zone and through the major fluid exit, and

a peripheral region across the back-flow fluid exit being closeable when the central region is opened and openable upon deflection at the periphery when the central region is closed and when fluid pressure in the downstream zone is higher than ambient pressure so as to allow escape of fluid from the downstream zone to atmosphere via the back-flow fluid exit.

11. Apparatus for use in an aerosol inhalation device, comprising:

a housing adapted to cooperate with, attached to, or formed integrally with a chamber to define a major fluid passage comprising an

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PATENTS ACT 1990

COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL

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Invention Title: Aerosol Inhalation Device

ASSOCIATED PROVISIONAL APPLICATION DETAILS

[31] Application No(s)	[33] Country	[32] Application Date
PK6139	AU	14 May 1991

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

the downstream zone and through the major fluid exit, and

a peripheral region across the back-flow fluid exit being closeable when the central region is opened and openable upon deflection at the periphery when the central region is closed and when fluid pressure in the downstream zone is higher than ambient pressure so as to allow escape of fluid from the downstream zone to atmosphere via the back-flow fluid exit.

There is further disclosed herein in accordance with a second preferred form of the invention a combination comprising the valve mechanism of the first preferred form and a chamber having formed thereon a grid extending across the major fluid passage adjacent to and supporting diaphragm, which grid comprises passages extending therethrough.

In accordance with a third preferred form of the invention, there is further disclosed herein an aerosol inhalation device comprising an aerosol holding chamber having disposed at one end thereof a diaphragm valve mechanism in accordance with the first preferred form mentioned above.

In accordance with a fourth preferred form of the invention there is further disclosed herein apparatus for use in an aerosol inhalation device, comprising:

a housing adapted to cooperate with, attached to, or formed integrally with a chamber to define a major fluid passage comprising an upstream zone within the chamber and a downstream zone,

a major fluid exit provided in the downstream zone;

a back-flow fluid exit in selective fluid communication with the downstream zone, said back-flow fluid exit comprising an annular passage surrounding said major fluid passage, said annular passage comprising an annular sealing ledge; and

a diaphragm mounted within the housing and comprising:

a central region interfacing the upstream and downstream zones and being openable to allow fluid flow therethrough from the upstream zone to the downstream zone and through the major fluid exit, and

a continuous peripheral region across the back-flow fluid exit being closeable by resting against said annular sealing ledge when the central region is opened and openable upon deflection at the periphery away from said sealing ledge when the central region is closed and when

elevational views respectively of a mask adapted to be attached to the aerosol inhalation device depicted in Fig. 2, and

Figs. 7(a) and 7(b) are schematic side elevational and end elevational views respectively of a flexible end cap forming part of the aerosol inhalation device depicted in Fig. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In the accompanying drawings there is schematically depicted an aerosol inhalation device 1. Device 1 comprises an aerosol holding chamber 15 having attached to one end thereof (the end distal of a user when in use) a flexible cap 16. Flexible cap 16 is adapted to fit over the distal end of cylindrical shell 17 and comprises an aperture 18 through which a standard inhaler mouthpiece is sealingly inserted so as to dispense airborne medication into chamber 15. Flexible cap 16 further comprises a number of valve slits 40 which open inwardly towards chamber 15 when fluid pressure therein is lower than ambient pressure. The tapered form of each valve slits 40 prevents opening thereof when fluid pressure within chamber 15 is higher than ambient pressure.

As an alternative to the provision of valve slit 40, any form of valve mechanism may be provided in cap 16.

Aerosol holding chamber 15 in the preferred embodiment comprises a cylindrical shell 17 having mounted thereto or formed integrally at the proximal end thereof, a housing 23 surrounding a diaphragm valve mechanism 10.

Diaphragm valve mechanism 10 comprises a diaphragm valve 11 supported by a supporting structure 12. Cylindrical shell 17, housing 23 and diaphragm valve support structure 12 are typically formed of a moulded plastics material. Attached to housing 23 and as shown in Figs. 1 and 2 via a large annular recess 25 is a face mask 13. Provision is made by way of a small annular recess 26 for fitting of a smaller child or infant sized face mask (not shown). Face mask 13 may be reversed and attached to annular recess 25 so as to locate mask 13 in a convenient storage position over and around cylindrical shell 17.

which comprises nose cover 38 may be utilised to establish a fluid seal between aerosol holding chamber 15 and the user.

Upon breathing inwardly, central portion 32 of diaphragm valve 11 will open whilst at the same time outer edge portion 31 of diaphragm valve 11 will close onto sealing ledge 28. Accordingly, aerosol suspended within chamber 15 will pass through the diaphragm valve 11 to be breathed in by the user.

Upon the user exhaling, central portion 32 will close and be retained in a closed position against grid 33 of diaphragm valve support structure 12. At the same time, peripheral outer edge portion 31 of diaphragm valve 11 will open so as to allow the user's exhaled breath to escape via passage 27 and exit ports 37.

If necessary, several breaths may be taken wherein the operation of diaphragm valve 11 repeats the above described steps.

During an inward breath, non-return valves 40 will open allowing air to enter chamber 15 thus displacing the suspended aerosol therein. Upon an outward breath, non-return valves 40 will close so as to prevent any inadvertent escape of aerosol from chamber 15.

It should be appreciated that modifications and alterations obvious to those skilled in the art are not to be considered as beyond the scope of the present invention. For example, diaphragm valve support structure 12, rather than being glued or otherwise affixed to shell 17 may be moulded integrally therewith. Furthermore, the specific means of retaining diaphragm valve 11 to support structure 12 may be altered without departing from the scope of the invention.

In addition, a breathing indicator for example in the form of a thin section of mask 13 may be provided. As such, the thin section will protrude and retract to indicate breathing to a doctor for example.

The applicant also envisages that any suitable type of valve or valves may replace non-return valves 40.

7. An aerosol inhalation device comprising an aerosol holding chamber having disposed at one end thereof an apparatus in accordance with claim 1.

8. The aerosol inhalation device of claim 7 further comprising a flexible cap adapted to fit over one end of the housing and comprising an aperture through which a standard inhaler mouthpiece is adpated to be sealingly inserted so as to dispense airborne medication into the chamber.

9. The aerosol inhalation device of claim 8 wherein said cap further comprises a valve or constriction adapted to separate the chamber from the exterior thereof so as to impair back-flow of fluid from within the chamber to atmosphere.

10. An apparatus substantially as hereinbefore described with reference to the accompanying drawings.

11. Apparatus for use in an aerosol inhalation device, comprising:

a housing adapted to cooperate with, attached to, or formed integrally with a chamber to define a major fluid passage comprising an upstream zone within the chamber and a downstream zone,

a major fluid exit provided in the downstream zone;

a back-flow fluid exit in selective fluid communication with the downstream zone, said back-flow fluid exit comprising an annular passage surrounding said major fluid passage, said annular passage comprising an annular sealing ledge; and

a diaphragm mounted within the housing and comprising:

a central region interfacing the upstream and downstream zones and being openable to allow fluid flow therethrough from the upstream zone to the downstream zone and through the major fluid exit, and

a continuous peripheral region across the back-flow fluid exit being closeable by resting against said annular sealing ledge when the central region is opened and openable upon deflection at the periphery away from said sealing ledge when the central region is closed and when fluid pressure in the downstream zone is higher than ambient pressure so as to allow escape of fluid from the downstream zone to atmosphere via the back-flow fluid exit.

DATED this TWENTY-SEVENTH day of MAY 1994
Lindrew Pty Limited

Patent Attorneys for the Applicant
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16114/92

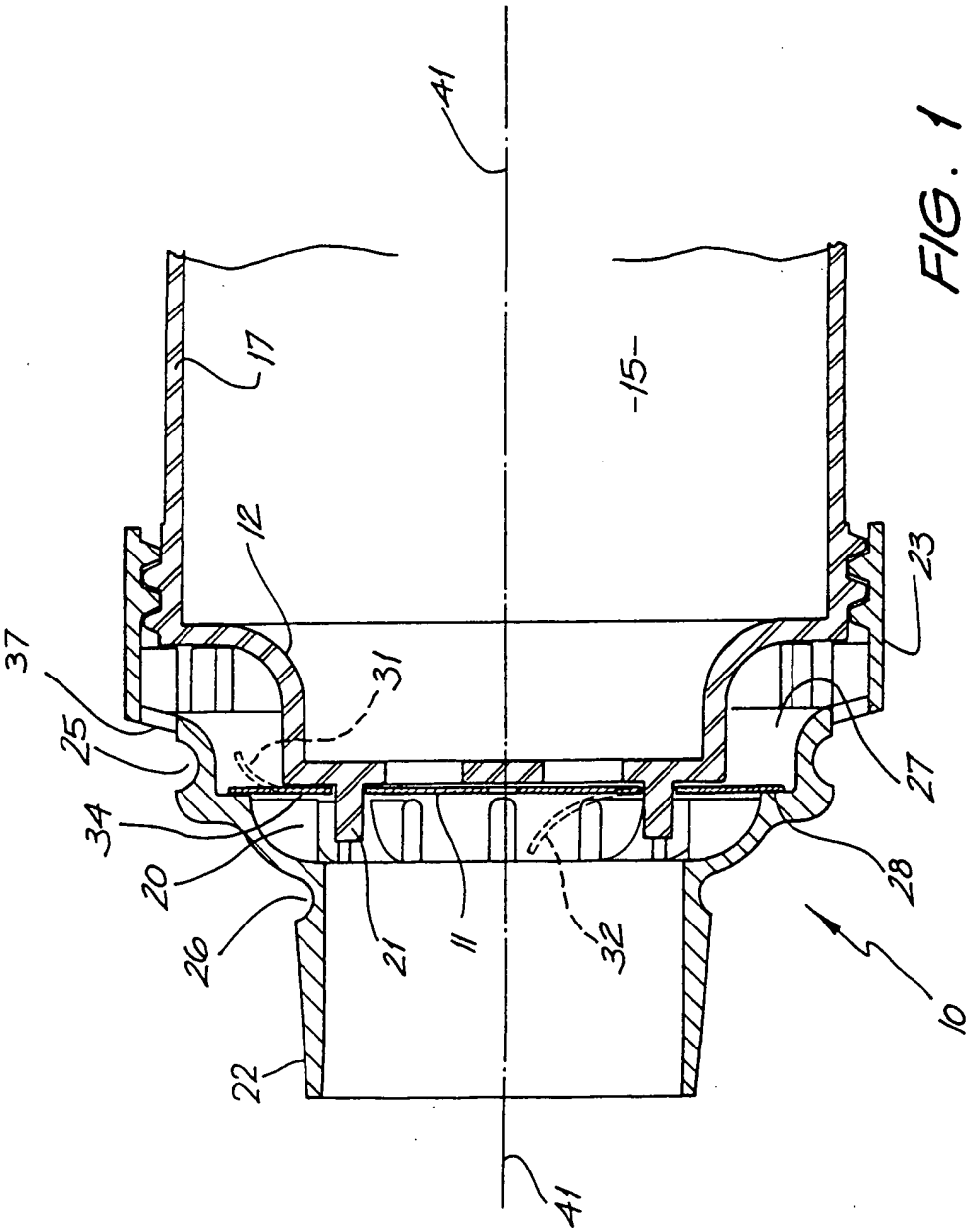

FIG. 1

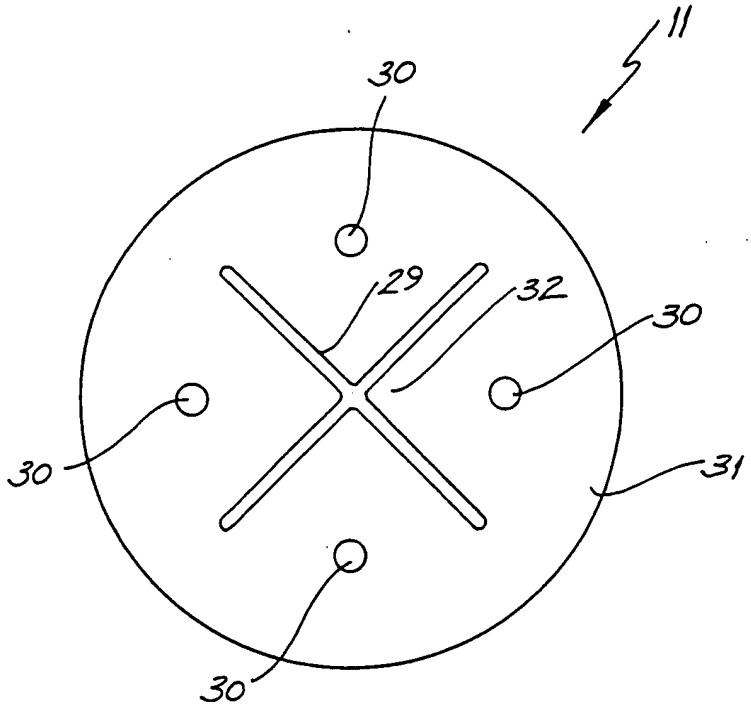

FIG. 3

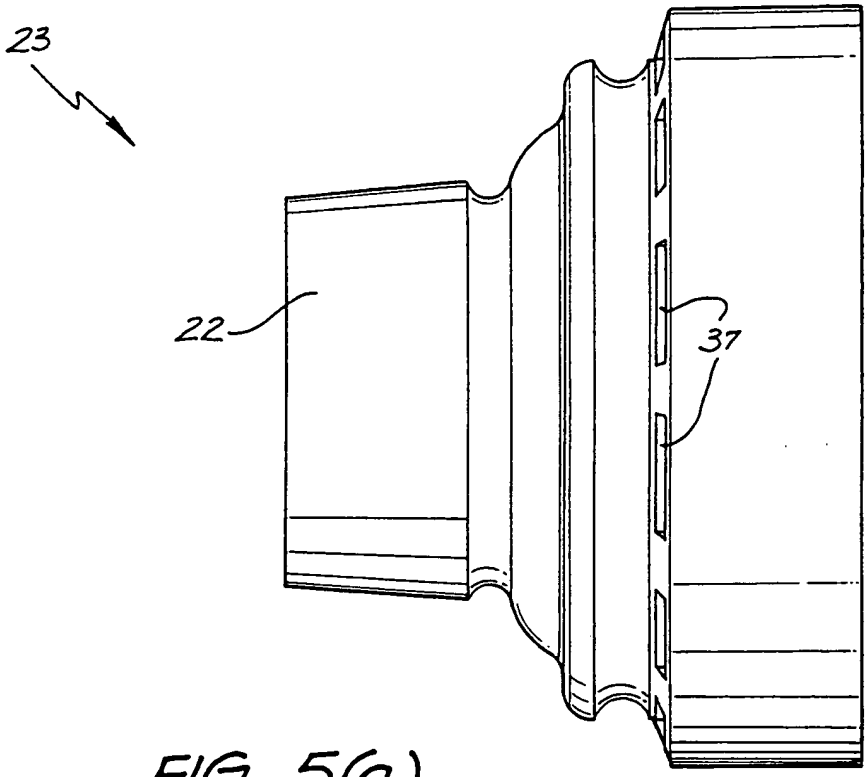

FIG. 5(a)

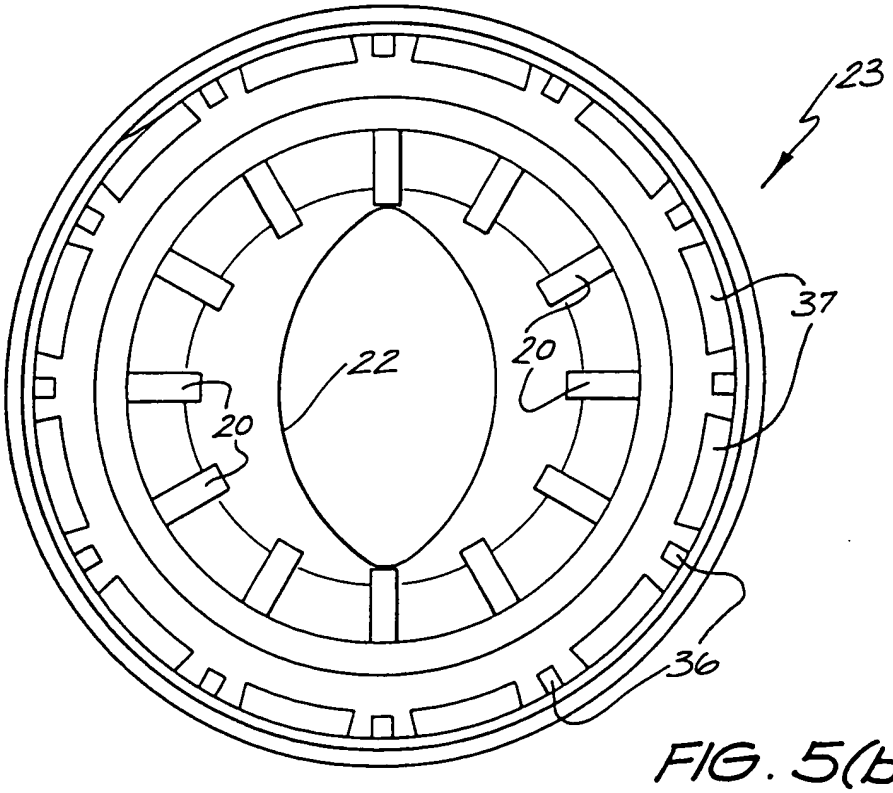

FIG. 5(b)

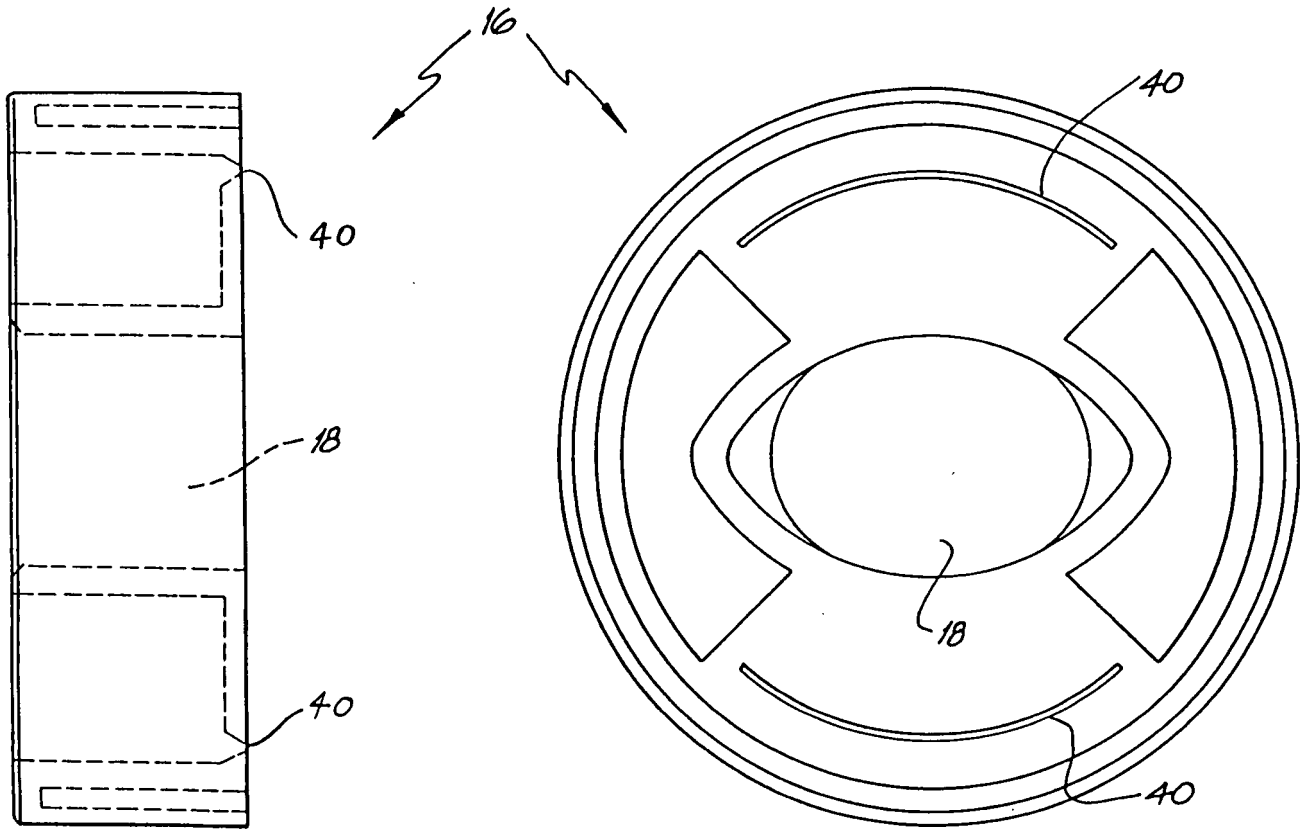

FIG. 7(a)

FIG. 7(b)